New developments - deployment of the nbn pit and conduit network

FTTx Network Engineering

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nbn has prepared this document as a guideline to the installation of pit and conduit infrastructure in new developments (also known as Greenfields developments). You should also refer to all relevant legislation, including the requirements in relation to fibre-ready facilities contained in the Telecommunications Act 1997.

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Revision history

Date	Revision	Details
30 SEP 2022	11.0	• Updated to include new pits over existing pit and conduit to connect super lot; Sections 3.7.4, 3.7.5 • Updated the document to provide clarifications on access cover labelling requirements; Sections 4.3.2, 4.3.3 • Updated the document to remove contradiction on Table 6 regarding maximum pipe combination for type 2 pit; Section 4.3.6
13 APR 2022	10.0	• Updates to revisions of Australian standards; Section 1.7 • Updates to super lot; Section 3.7.4 • Updates to include solutions for Smart Places project (Non Premises Locations); Section 3.7.7 • Updates to Table 6 with changes to the number of P20 into Type 2 pit; Section 4.3.6 • New Section for Recessed Pit Lids (Access Cover); Section 4.3.3
02 JUL 21	9.0	• Pit types in Reactive soils; Section 4.3.7 • Updates to super lot; Section 3.7.4
08 JAN 18	8.0	• Added new content in Sections 3 and 4. Details in Section 1.8 Changes in this revision.
18 AUG 16	7.0	• Rebranding and security update. • Added statements for Section 1.1 Background, Section 1.4 Scope (In scope and Out of scope) and Section 1.6 Assumptions and constraints. • Removed Fibre Distribution Hub (FDH) information and added new diagrams for super lots and references for Flexibility Joint Location (FJL).

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1 About this document

1.1 Background

This document is intended for developers to ensure they meet **nbn's** requirements for the installation of pit and conduit for new broad acre developments.

1.2 Purpose

This document, in conjunction with documents listed in Section 1.7, provides guidelines for developers installing **nbn**™ pit and conduit infrastructure in real estate development projects.

This document provides guidelines and technical details for new development site developers and designers to install the pit and conduit infrastructure required for the **nbn**™ Fibre to the Premises (FTTP) network.

The developer is responsible for installing pit and conduit to **nbn** guidelines. **nbn** will only supply the fibre and other elements of a complete FTTP solution once fibre ready facilities are prepared to **nbn**'s guidelines.

Important: These guidelines are a guide for undertaking pit and conduit works installation for the **nbn** in new developments.

These guidelines are, for the purposes of the developer agreement, the **nbn**™ pit and conduit specifications and must be complied with to the extent specified in the developer agreement.

These guidelines should not be relied upon by any contractor or any other person as a substitute for knowledge, experience, care and skill or any other contractual obligation or as a guide to your rights and obligations under laws concerning the roll out of fibre by **nbn** to new developments.

The regulatory environment in connection with the installation of fibre ready facilities in real estate development projects is not yet settled. It is the responsibility of the developers and their contractors to become familiar and comply with all applicable laws and contractual obligations.

Nothing in these guidelines will affect any rights **nbn** has (whether at law or under contract), or any obligations or warranties given by the contractors to **nbn**.

1.3 Health, Safety & Environment (HS&E)

nbn is subject to the Work Health and Safety Act 2011 (Commonwealth). However, it is recognised that developers and their contractors may be subject to different health and safety legislation in place across the various jurisdictions in Australia. This includes relevant regulations, standards and codes of practice.

These guidelines provide guidance to assist **nbn**, the developers and their contractors to exercise due diligence in relation to safety practices. To this end, without limiting developer's obligations under law:

- Developers are expected to have developed, understand and comply with their own Health, Safety and Environment policies and procedures.

- Consistent with Commonwealth and state and territory occupational HS&E legislation, it is expected that developers and their contractors consider the risks associated with their development that may impact on later stages of the asset lifecycle (including inspection/assurance, use, operation, construction and maintenance). Specific aspects which the developer and their contractors must consider include (but are not limited to) risks associated with the selection of pit and conduit components, and risks associated with the method of construction/installation selected by the developer.

The mandatory requirements specified in the **nbn**™ HSE Critical Risk Controls and Guidance are in addition to other requirements under contractor legislation and do not replace or limit any **nbn** or Delivery Partner obligation to manage HSE risks. It is also important to note that the Critical Risk Controls are not exhaustive of all controls required to manage HSE risks.

The information within this document has been prepared with an understanding that HSE risks may be evident and will require assessment with due consideration to CRC requirements by **nbn** or the Delivery Partner participating in any activity prescribed within the document and controls are documented in relevant safe work systems (e.g. SWMS, Procedure etc.) and adhered to.

1.4 Scope

1.4.1 In scope

- new Single Dwelling Unit (SDU) developments located within the FTTx footprint
- super lots, horizontal Multi Dwelling Units (MDUs), commercial, vertical MDU (lead-ins)

1.4.2 Out of scope

- new developments outside the **nbn**™ FTTx footprint
- new developments within the satellite footprint
- new developments within the fixed wireless footprint
- Brownfield MDU and SDU pit and pipe builds

1.5 Audience

- new development site developers
- new development site designers

1.6 Assumptions and constraints

The developer and/or their representative should have a sound level of knowledge, understanding and experience/accreditation for installing any telecommunications pit and conduit for **nbn** to utilise in its FTTx network.

1.7 Referenced documents

Document number	Document name	Owner
AS/CA S008:2020	Requirements for customer cabling products	Communications Alliance
AS/CA S009:2020	Installation requirements for customer cabling (Wiring rules)	Communications Alliance
C524:2013	External Telecommunication Cable Networks	Communications Alliance
G645:2017	Fibre Ready Pit and Pipe Specification for Real Estate Development Projects	Communications Alliance
AS 3996 - 2006	Access covers and grates	Standards Australia
AS/NZS 1477:2017	PVC pipes and fittings for pressure applications	Standards Australia
AS/NZS 2032:2006	Installation of PVC pipe systems	Standards Australia
AS/NZS 4586 - 2013	Slip resistance classification of new pedestrian surface materials	Standards Australia
NBN-COO-EDS-017	New Development Pit & Pipe Design Guidelines	FTTx Engineering
NBN-DES-STD-3294	NBN Earth Potential rise (EPR) Management	Power and Aerial
NBN-DES-STD-0011	Preparation and installation Guide – SDUs and MDUs	FTTX Engineering

1.8 Changes in this revision

Changes in this document revision 11 dated 30 SEP 2022 compared to the previous revision 10.0 dated 13 APR 2022 are summarised below:

Section	Details
3.7.4 , 3.7.5	New pits over existing pit and conduit to connect super lot.
4.3.2 , 4.3.3	Clarifications on access cover labelling requirements.
4.3.6	Remove contradiction on Table 6 regarding maximum pipe combination for type 2 pit.

2 Assets

2.1 Asset protection

2.1.1 Verification

Prior to any excavation work being undertaken, all existing underground services within the proposed work zone shall be identified via Dial Before You Dig (DBYD), council plans and all other parties, services or contacts that may not be represented by the DBYD services. These may include:

- main road authorities
- rail services
- gas suppliers
- water utilities

Any pre-existing services in an area where pit and conduit works are to be deployed must be identified visually prior to commencement of the works, using methods such as strip exposure and non-destructive digging.

2.1.2 Installation

All **nbn**™ assets must be installed within the designated telecommunications alignment, established by any of the following:

- state and federal government
- street opening conference/bodies
- local council(s)
- a shared trench agreement

2.2 Asset identification

All design documentation (including initial development documentation, pit and conduit design and as-built or other documentation) prepared by the developer and its contractors must identify the proposed location of all network infrastructure and address, as a minimum, the following:

- the location of pits and conduits, including measurements in metres or parts thereof
- positioning information relative to known fixed assets (e.g. kerb lines, property boundaries)
- locations of roads, driveways and proposed roads and driveways.
- depth of cover for conduits

Depth of cover is the actual soil or backfill from the top of the conduit.

- trench cross-sections, showing all services within the same alignment
- identification of conduits (e.g. local or distribution)

- service drop locations and either local pit or boundary pit pre-allocations
- the final positioning of **nbn**™ network infrastructure is determined by **nbn** at its sole discretion

Specific drafting standards apply to both pre-construct and as-built documentation of **nbn**™ pit and conduit network designs. **nbn**'s requirements and required use in relation to these Computer Aided Design (CAD) standards - including the approved template, symbols and Assisted Drafting Tool (ADT) can be found in ***NBN**-COO-EDS-017 New Development Pit & Pipe Design Guidelines*.

3 FTTP network overview

The **nbn**™ FTTP network is designed to provide fibre connectivity to premises within new development projects.

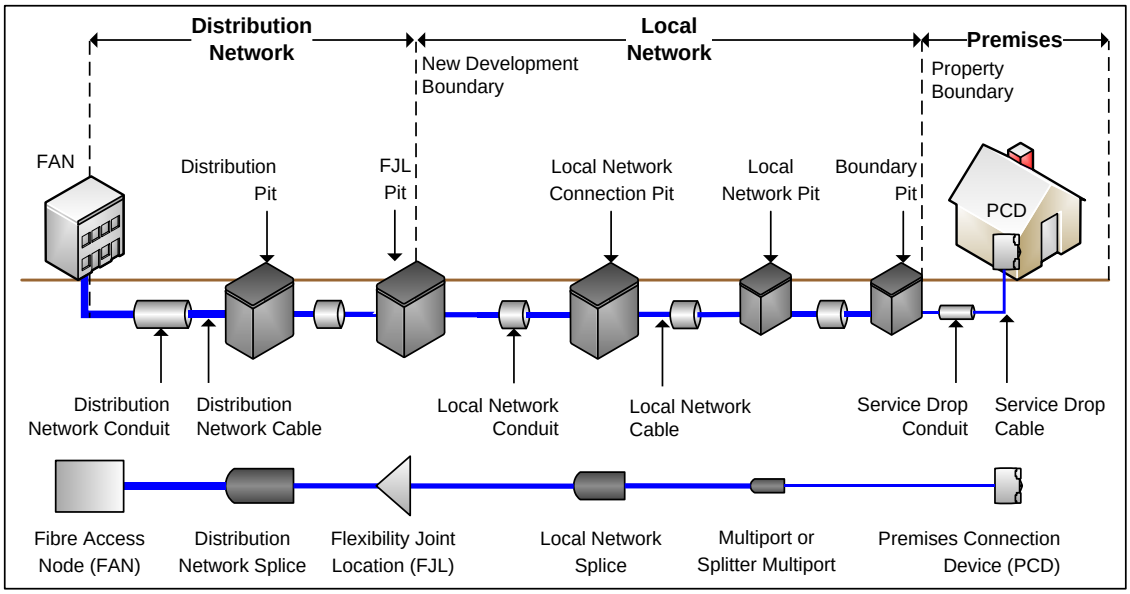

Figure 1. FTTP network

The FTTP network is divided into hierarchical components which assist in the planning, design and implementation of the FTTP network. Network components shown in Figure 1 that are relevant to new development project deployment of fibre ready facilities are set out below.

3.1 Distribution network (DN)

The DN provides connectivity between the **nbn**™ Fibre Access Nodes (FANs), where the active equipment is located, and the FJL. The FJL represents the demarcation point between the DN and the Local Network (LN). The DN will also be installed between all FJLs in the new developments, as shown in Figure 2.

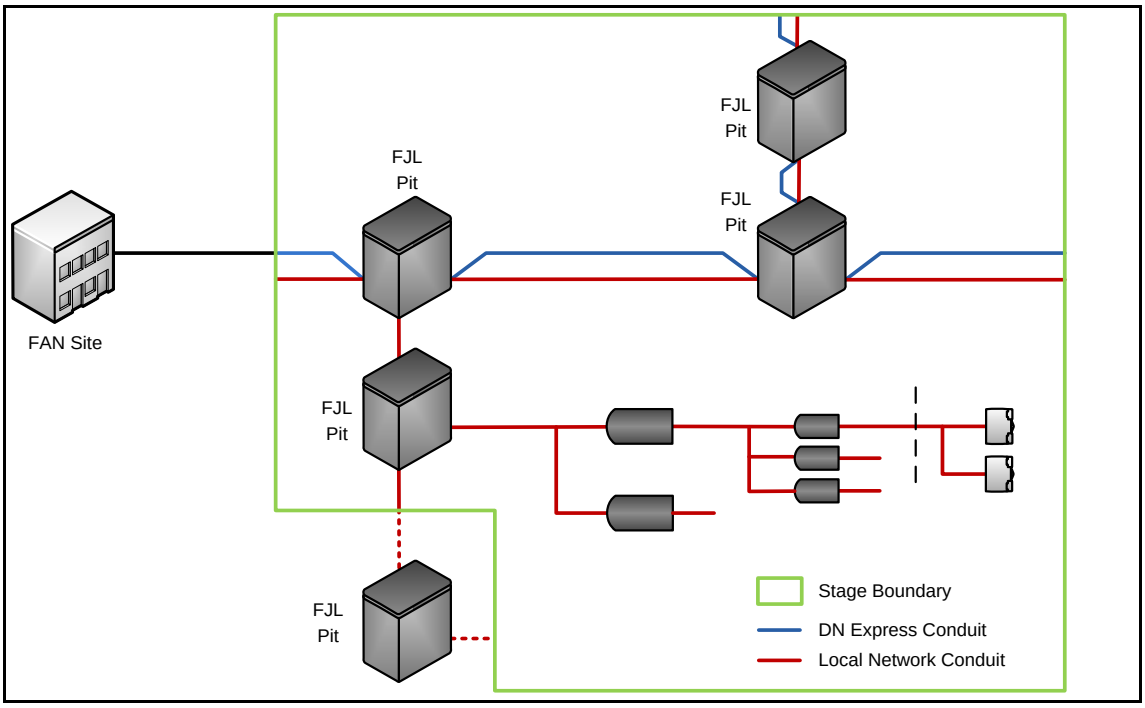

Figure 2. Network hierarchy

3.2 Local Network (LN)

The LN is installed between the FJL, and the associated telecommunication pits located outside property boundaries.

3.3 Telecommunications pits

nbn requires pits for several distinct purposes including:

- managing connections between conduits
- housing fibre optic cabling and splice closures
- housing the Small Footprint Multiport (SFM) and Splitter Multiport (SMPs) required to connect End User Premises (EUP) to the LN

3.4 Telecommunications conduits

Conduits provide the pathways for the subsequent installation of fibre optic cabling.

The DN fibre and the LN fibre may be contained within the same conduit.

3.4.1 Telecommunications service drop conduit

The service drop conduit is located between the telecommunication pits and either the property boundary location or the EUP.

3.5 Network design guidelines

The design of the network ideally begins at individual lots and follows a modular approach as shown in Figure 2. That is, lots (typically four [4] but up to a maximum of eight [8]) are allocated to a service drop access pit or boundary pit, accessible by the local conduit network (refer to Figure 4).

It is not always possible to get four (4) lots per pit. Conversely, there will be situations where the trenching is designed (for electrical reticulation, etc.) such that it may be expedient to service a fifth or sixth lot from a pit.

3.6 DN guidelines

The DN requires a single P100 conduit installed between the entrance to the development and the first FJL.

Further FJLs may require a separate P100 conduit (express conduit) installed between them, with the last planned FJL requiring a P100 conduit to the development exit, as shown in Figure 2. **nbn** planning would provide feedback on the express conduit routes and FJL requirements. Feedback will be provided to the developer and/or design consultants.

The express conduit can share or where required bypass LN pits, but must connect to pits where the express conduit changes direction or exceeds a distance of 250 m.

Important: The DN must also provide connectivity to the adjoining stage/s.

3.6.1 Distribution entry and exit locations

A distribution pit will be installed at the DN entry and exit boundary locations of the development to provide a connection location between the development DN and the **nbn**™ DN, when available.

For developments that have an entry and exit on the same road, a minimum of one P100 conduit should be installed (unless otherwise specified by **nbn**) between the two distribution pits across the entrance road to the development, to allow for cables to be installed past the development.

3.7 LN guidelines

The LN requires a minimum of one P100 conduit. The conduit is installed along the property boundary before connecting into pits situated at, or near, each shared street facing the property boundary.

In a cul-de-sac scenario, the last section of the pit and pipe can utilise P50 to a P5 or P2 pit, if no further network is required.

Important: The LN must also provide connectivity to the adjoining stage/s.

3.7.1 Road crossing guidelines

- All road crossings associated with the LN use P100 conduits.
- All road crossings connecting to a service drop access pit or boundary pit used solely for service drops shall use P50 conduits.

3.7.2 Local duct network methods

There are two methods permitted for deploying the local duct network, depending on available trenches in the development:

- single side deployment
- dual side deployment

3.7.2.1 Single side deployment

A P100 LN conduit is installed on one side of the road only, as shown in Figure 3. Single side deployment. This conduit is installed into pits located between property boundaries, i.e. pits should be offset from the side boundary that separates two properties, this is to avoid installing pits in driveways or proposed driveways. As outlined in Section 4.3.4.1 of this standard.

A P50 local lateral conduit is installed under the road between the LN pits on one side of the road and smaller boundary pits on the opposite side.

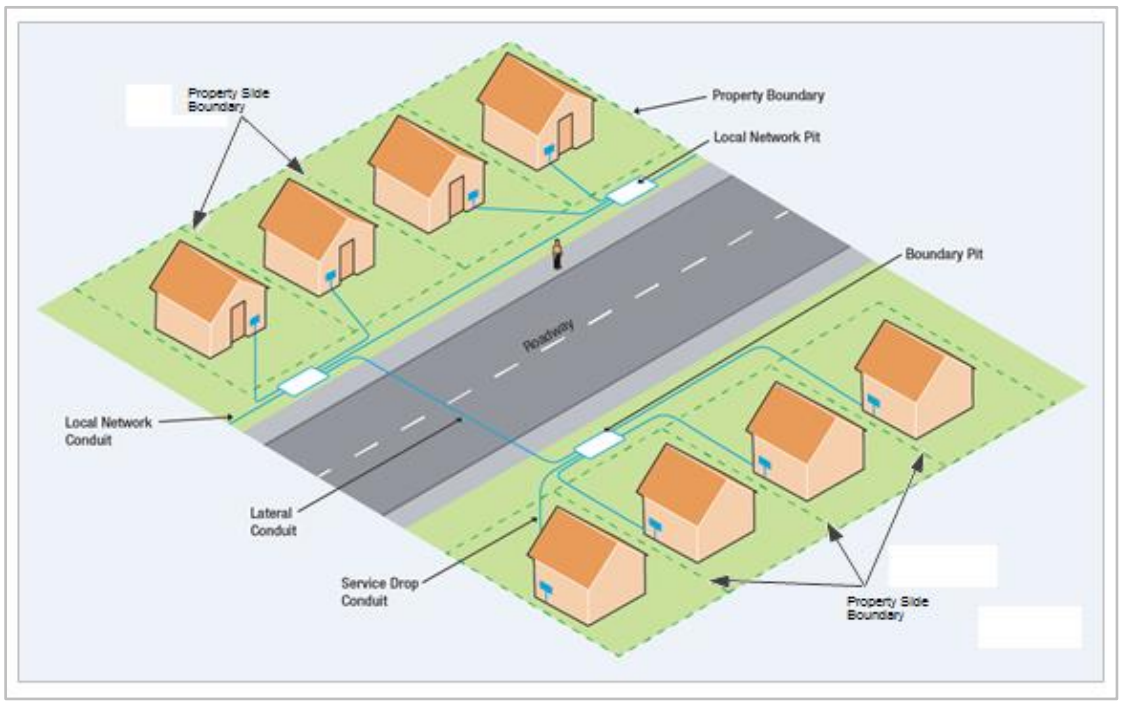

Figure 3. Single side deployment

3.7.2.2 Dual side deployment

A P100 LN conduit is installed in the following locations, as shown in Figure 4:

- on both sides of the road
- into the LN pits located between property boundaries

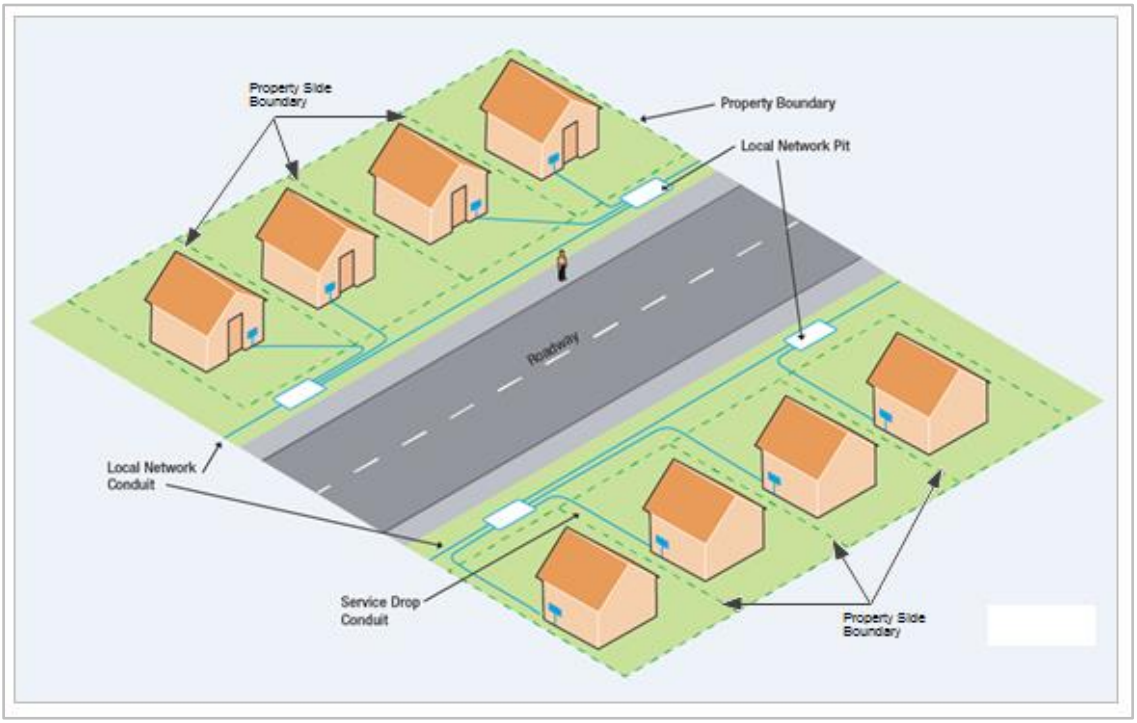

Figure 4. Dual side deployment

3.7.3 Local duct network methods - laneways

It is anticipated that in a small number of cases it may not be possible to deploy a single or dual sided LN. This will typically be as a result of physical access limitations to the premises; generically this is termed a laneway.

A laneway is identified as having no verge available to install pit and conduit as per **nbn**'s requirements outlined in Section 3.7.2 Local duct network methods.

To provide connectivity for developments situated in a laneway, the following options are available and listed in order of preference:

1. front loaded deployment (most preferable)
2. Public Open Space (POS) deployment
3. rear loaded deployment (least preferable)

> For a developer to implement a subsequent preference, the developer must provide a justification as to why the preceding preference could not be met. This will then be presented to **nbn** for endorsement.

3.7.3.1 Front loaded deployment

Premises can be fed by the LN conduit. In this instance, the developer should service the property from the street and follow the single or dual sided deployment rules.

3.7.3.2 Front loaded using POS

Premises can be fed by a POS. In this instance, the developer should service the premises from the POS and follow the single or dual sided deployment rules.

3.7.3.3 Rear loaded deployment

In this instance, either service, boundary or LN pits will need to be installed on the customer boundary (refer to Figure 7).

Service easements should be provided by the developer inside the rear of the lots to allow pits and conduits to be installed. Service boundary or LN pits are to be installed:

- perpendicular to the street property boundary to maintain appropriate separation from other services (e.g. gas, power, water) (the conduit must still enter at the narrow end of the pit)
- a minimum of 100 mm inside the property boundary

This solution allows the developer to service a laneway of up to a maximum of 24 lots in total.

A SFM or SMP is installed in the LN connection pit and service drop cables are reticulated through each connected pit.

If the number of lots requires the use of a second SFM or SMP, this will be housed in the local connection pit at the other end of the laneway.

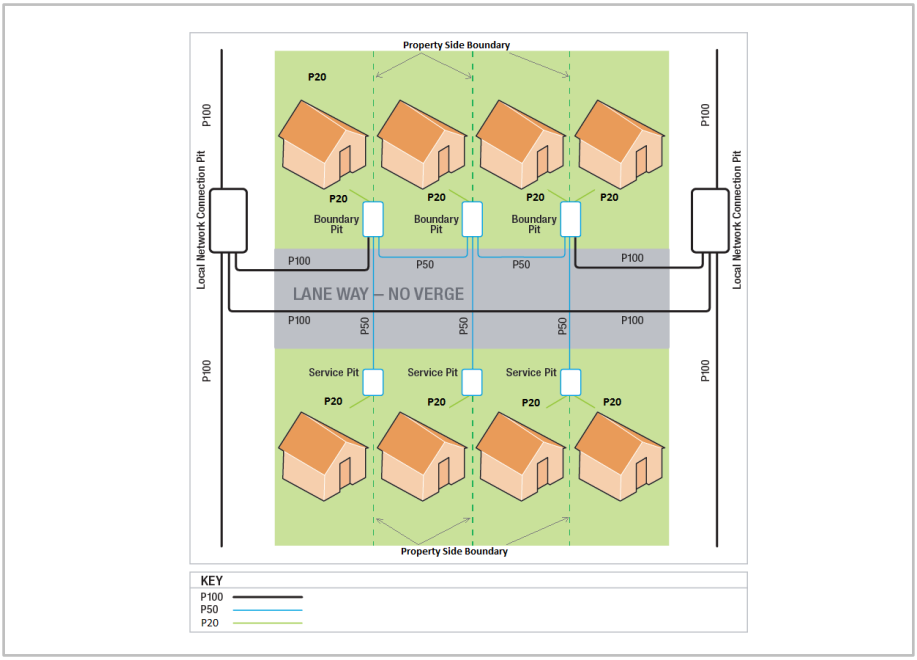

Figure 5. Service easement deployment

Important: In the laneway scenario, boundary and service pits shall be installed correctly on service easements provided by the developer.

3.7.3.4 Pit selection - laneways

LN connection pit: Located at either end of the laneway and connecting the distribution conduit reticulating the remainder of the stage.

Boundary pit: All boundary pits **within a laneway** are to be orientated as described in Section 3.7.3.3 Rear loaded deployment.

Service pit: All service pits **within a laneway** are to be orientated as described in Section 3.7.3.3 Rear loaded deployment.

Refer to Table 5 in Section 4.3.2 Pits and lids for details on pit dimensions.

Important: Pits shall not be located in driveways or proposed driveways.

3.7.3.5 Conduit selection - laneways

A P100 express conduit is installed between the LN connection pits. **This is mandatory.**

The first conduit at either end of the laneway linking the LN connection pit to the first boundary pit within the laneway **shall** be a P100.

A P50 conduit **shall** be installed from the first boundary pit within the laneway to the remaining boundary pits within the laneway.

A P50 conduit **shall** be used to connect a service pit to the boundary pit. Only one connection is permitted between a boundary pit and service pit.

All P50 and P100 conduit bends **shall** be long radius 90 degree bends.

3.7.4 Super lot

When servicing a super lot as part of a new development or development stage the following applies:

- all sides of the super lot that are street frontage must be adequately serviced by locating pits and minimum P100 conduit along the road reserve on all relevant sides connecting into the current stage/s of the LN as shown in Figure 6.
- All new street facing dwellings must be interconnected via existing or new pit and pipe. **nbn** provides a single point of connection to service all dwellings.
- Any Pits to support the LOT/S Service drop conduit connection that require installation over existing network duct shall be installed by nbn at the developers cost. Apply online to NBNCO Relocation Works. *(Link to Modifying nbn™ infrastructure | nbn (nbnco.com.au)*

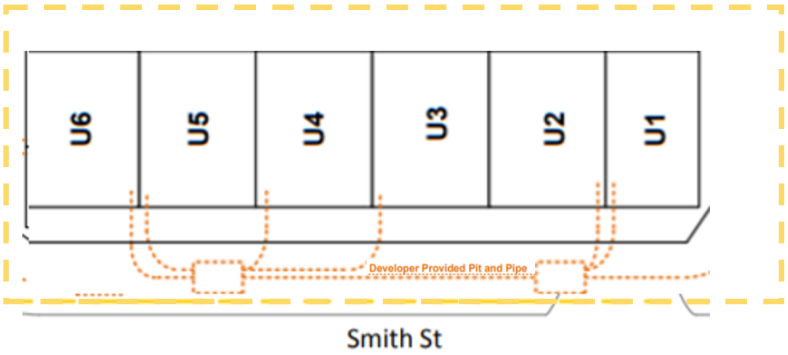

Figure 6. Example of super lot with four (4) to 24 premises

Refer to Section 4.2.7 Pits and lids for details on pit dimensions.

3.7.5 Super lot pit and conduit internal reticulation

Internal pit and conduit:

- Where the super lots yield is three (3) or less internal premises, the premises can be serviced by three (3) individual P20 lead-in conduits located in common property (refer to Figure 7).

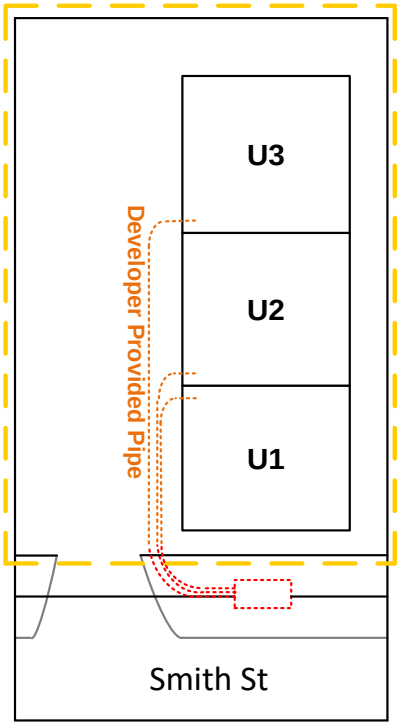

Figure 7. Example of super lot with three (3) or less than premises

- Where a super lots yield is four (4) to 24 internal premises it would require the installation of an internal pit and conduit network. This internal network will require P50 conduit, including lateral crossings to smaller pits on the other side to support service drop conduits and lead-ins to each dwelling (refer to Figure 8).

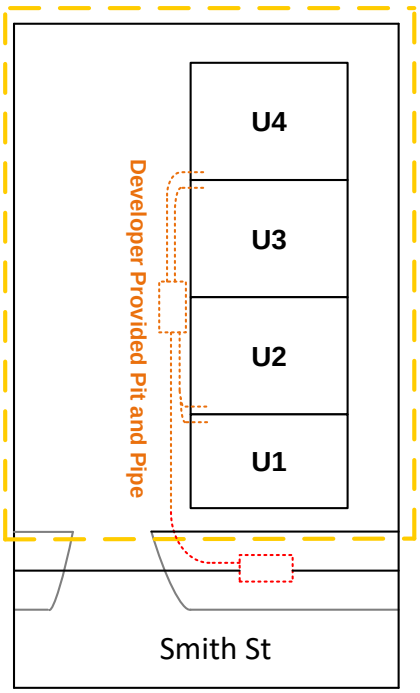

Figure 8. Example of super lot with four (4) to 24 premises

- Where a super lots yield is 25 or more internal premises, it will require the installation of an internal pit and conduit network. This internal network will require P100 conduit for the LN, with P50 lateral crossings to smaller pits on the other side to support service drop conduits and lead-ins to each premises (refer to Figure 9).

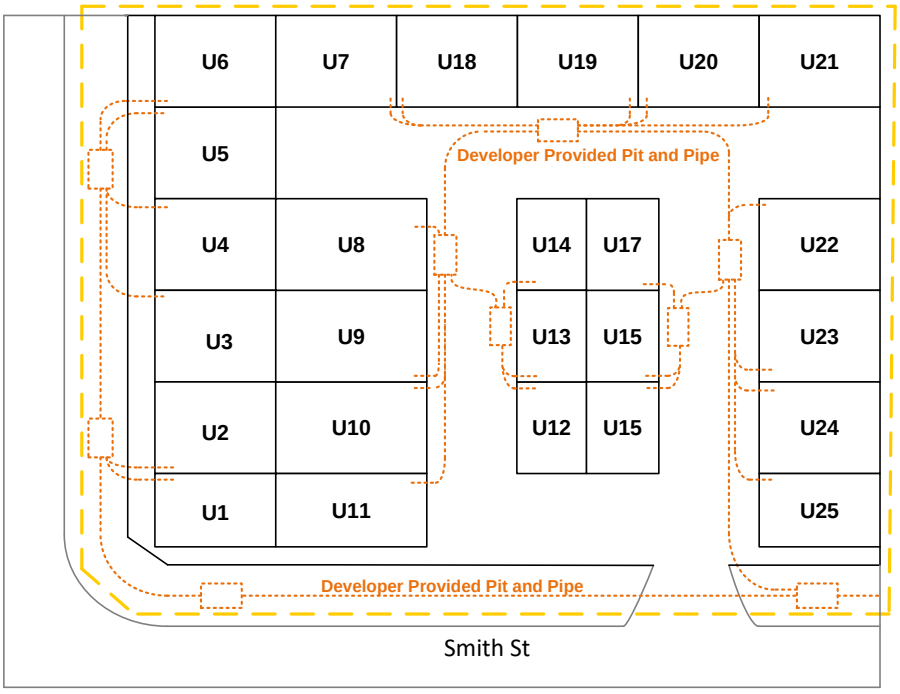

Figure 9. Example of super lot with 25 or more premises

- The installation of the internal pit and conduit shall reflect either single side or dual side deployment as per Section 3.7.2 Local duct network methods.
- Pits shall be installed within the super lot in a suitable area not trafficable to vehicles.
- Pits and conduits shall not be installed in or cross individual titles within the super lot (excluding laneways, as per Section 3.7.3.3 Rear loaded deployment).
- Where pits are unable to be installed in landscaped areas or internal footpaths, they must be installed within barrier kerb for protection (refer to Section 3.7.6 Barrier kerb).
- Where new pit and LIC interconnection is installed by the Carrier at the Developer's cost. *(refer to Figure 10 & Figure 11)*

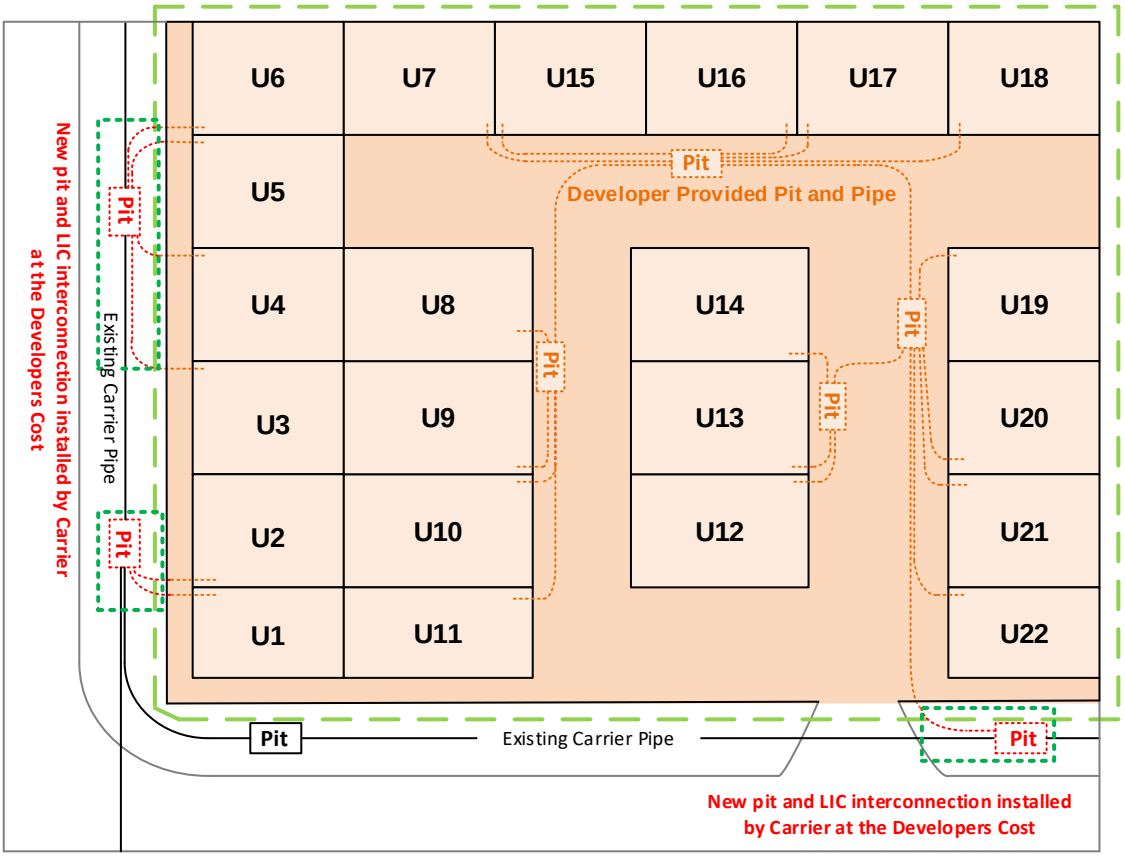

Figure 10 – Example of new pit to cater for super lot with 25 or more

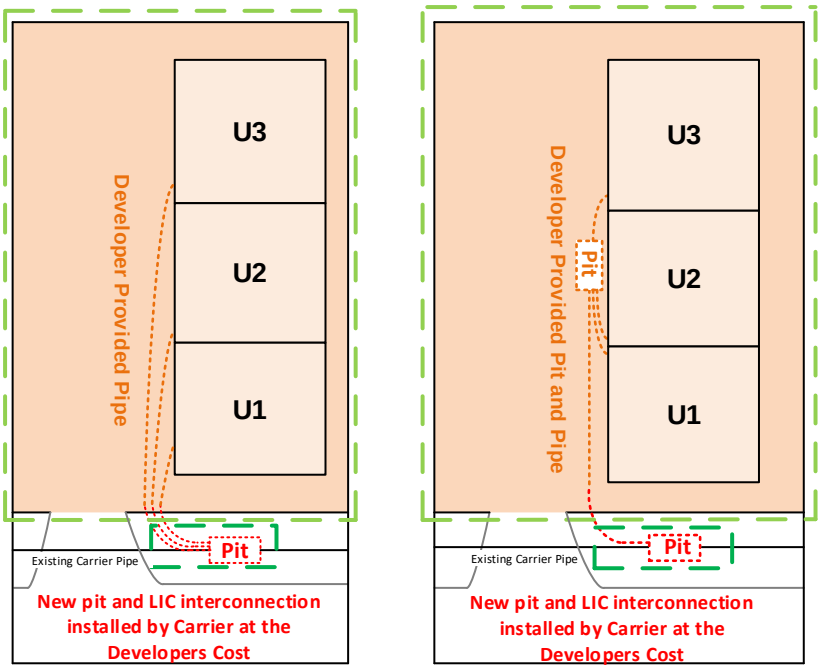

Figure 11 - Example of new pit to cater for super lot with four (4) to 24 premises

3.7.6 Barrier kerb

Barrier kerb is for the protection of pits and is to be used within super lots, only where suitable pit locations such as raised garden beds are not available.

The barrier kerb type is B1 or similar (all dimensions are shown in millimetres).

Maintain a minimum of 150 mm separation from the back of the barrier kerb to the outer edge of the pit, along all exposed sides of the pit (refer to Figure 8).

The top of the pit must be level with the top of the barrier kerb.

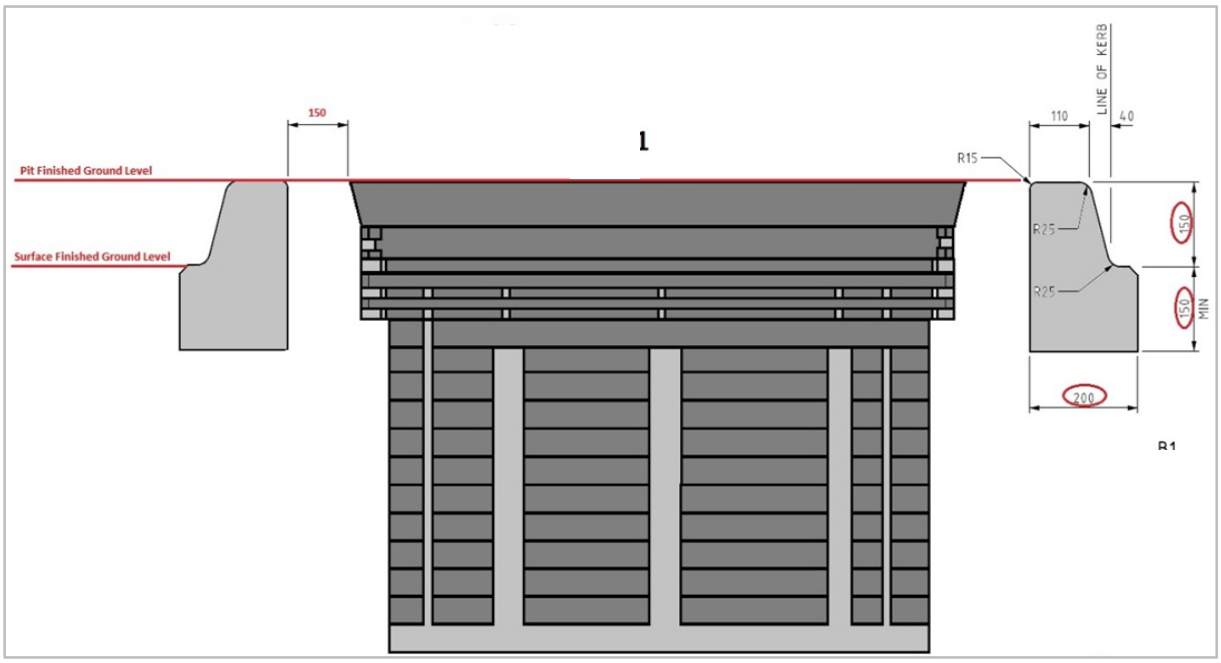

Figure 12. Barrier kerb dimensions

3.7.7 Smart Places

Smart places products enable connection to locations that are not classified as premises (Non-Premises Locations: NPL). These locations can be:

- Traffic Light Controller Cabinet
- Cameras
- Utility Sensors
- Electronic Signs

Where a smart place is required in the estate, a P50 link conduit is required to connect a customer demarcation pit. This demarcation pit shall be a type 2 pit. The following design requirement should be followed:

- One demarcation pit for one End User
- Demarcation pit location should be as close as practical to the NPL (Maximum distance of 10m)
- A P20 starter pipe should be installed with the demarcation pit, to a length of 1m and capped
- The link conduit should have a maximum distance of 50m. Where this cannot be achieved, extend the local network pit and pipe closer to the demarcation pit.

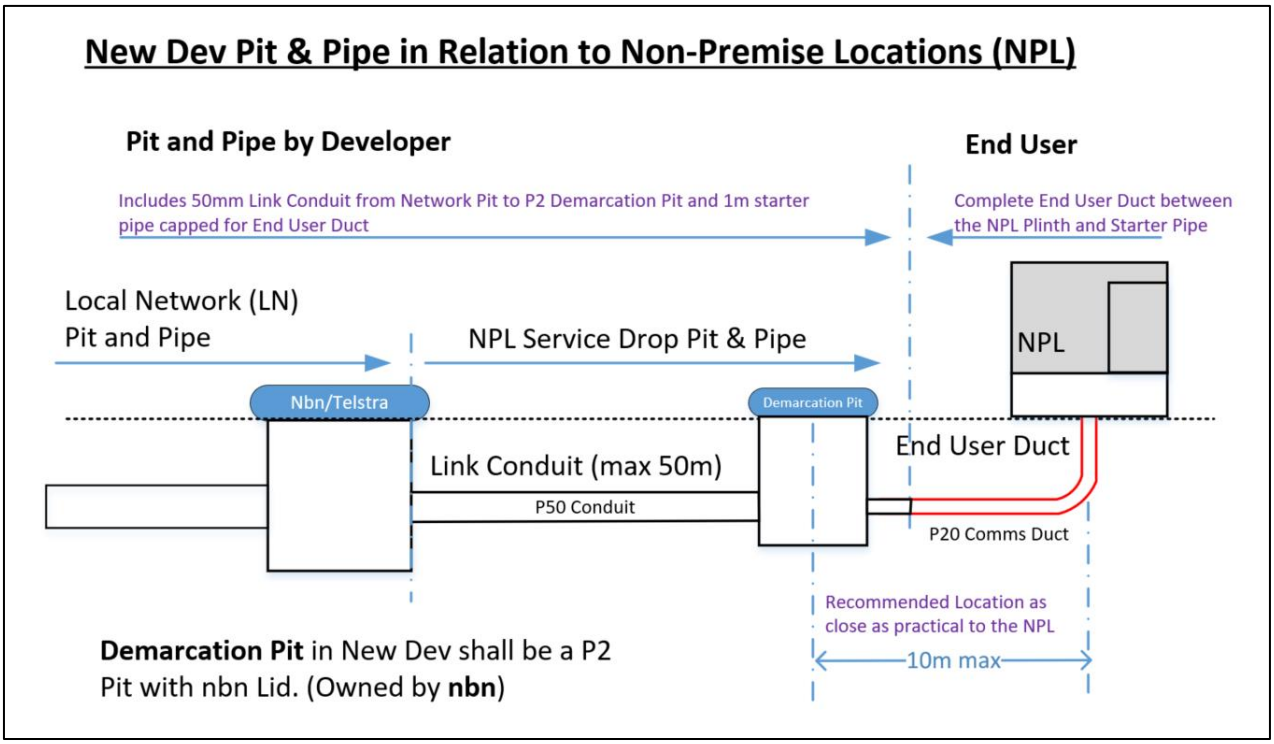

Figure 13. Pit and Pipe Overview for NPL

4 Underground network components

4.1 Overview

All pits and conduits must be installed within the designated telecommunications alignment established by any of the following:

- state and federal governments
- street opening conference(s)/local council(s)
- in any shared trench

If for any reason this alignment cannot be used, a suitable alternative must be determined prior to design and installation, with approval from **nbn**.

4.2 Conduit guidelines

4.2.1 DN and LN conduits

nbn requires the following in connection with both DN and LN conduits:

- 50 mm and 20 mm nominal diameter conduits as detailed in *AS/NZS 1477:2017 PVC pipes and fittings for pressure applications* Table 4.2(A) for wall thickness tabled under PN12 nominal sizes (DN) of 20 and 50 mm, referred to as P50 and P20
- 100 mm nominal diameter conduits as detailed in *AS/NZS 1477:2017 PVC pipes and fittings for pressure applications* Table 4.2(A) for wall thickness tabled under PN9 nominal sizes (DN) of 100 mm, referred to as P100
- The conduit is white and labelled as required by *AS/CA S008:2020 Requirements for customer cabling product*s, as it applies to customer cabling products.
- The conduit meets the minimum requirements of:
  - *AS/CA S008:2020 Requirements for customer cabling product*s, as it applies to customer cabling products
  - *C524:2013 External Telecommunication Cable Networks*
- All road crossing conduit installations are installed as close to 90° to the line of the road under which the conduits are being installed.

Conduit dimensions:

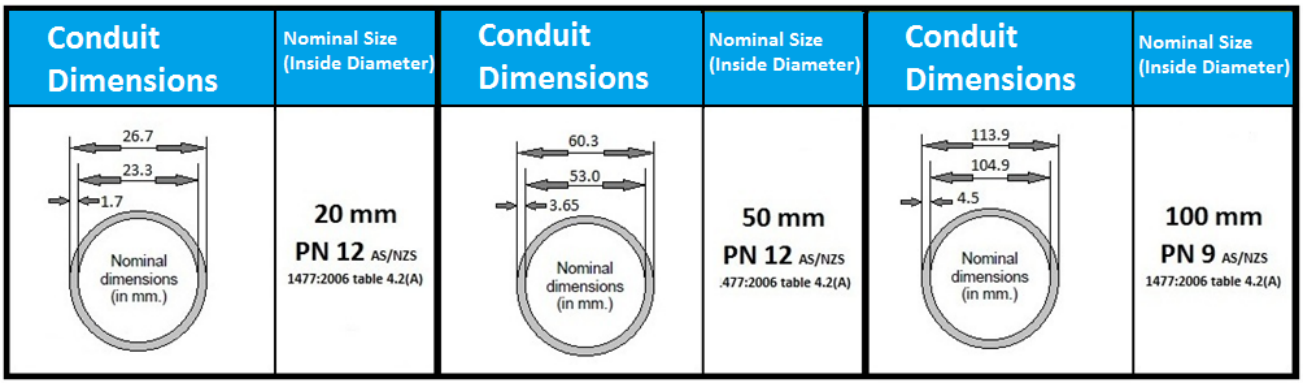

Figure 14. Nominal conduit dimensions

Important: Conduits should not be installed in runs greater than 250 m without transitioning through either local or distribution pits. If the distance is greater, too much stress might be placed on cable when it is hauled through the conduits.

4.2.2 Lateral conduits

nbn requires the following in connection with lateral conduits (i.e. conduits that feed across streets for service drop cables):

- The lateral conduits are P50 - 50 mm nominal diameter conduits as detailed in *AS/NZS 1477:2017 PVC pipes and fittings for pressure applications* Table 4.2 (A) for wall thickness tabled under PN12 nominal size (DN) of 50 mm.
- The conduit is white and labelled as per *AS/CA S008:2020 Requirements for customer cabling product*s, as it applies to customer cabling products.
- The conduit meets the minimum requirements of:
  - *AS/CA S008:2020 Requirements for customer cabling product*s, as it applies to customer cabling products
  - *C524:2013 External Telecommunication Cable Networks*
- All road crossing conduit installations are installed as close to 90° to the line of the road under which the conduits are being installed.

4.2.3 Conduit bends

nbn requires the following for conduit bends:

- all conduit bends are prefabricated
- conduit bends need to be of the same material and structure as the conduit
- a maximum sum of 180° of bend is allowed between pits (if this figure is exceeded, a pit needs to be installed as centrally as possible in the conduit run in order to bring the sum of bend angles into compliance).

The long run bend radius with manufactured or pre-formed bends (also referred to as cold form bends) are typically in multiples of 22.5° for P100 conduit.

The long run curve radius with no manufactured or preformed bends may be used on all conduit runs, including trunk runs (e.g. where there is greater than 100 m between pits).

A larger curve radius is required on long runs because there is typically more cable mass to haul through a conduit.

The short run bend radius is not to be used on express conduit routes.

Elbows (i.e. a sharp 90° change of direction) shall not be used.

Table 1. Minimum curve and bend radii

Minimum internal conduit diameter	Minimum curve/bend radius		
	long run (mm) no pre-formed bends	long run (mm) using pre-formed bends	short run (mm) using pre-formed bends
100 mm	13,000	5,000	800
50 mm	6,500	800	300
20 mm	2,600	not applicable	300

To change the direction of a P100 conduit, use only combinations of bends with angles of:

- 30° x 5 m radius
- 45 ° x 5 m radius

Important: Short radius 90° conduit bends are not to be used for P100 conduit in the DN or LN when changing direction. However, a 90° P100 1200 mm sweeping bend may be utilised to change direction for the DN or LN. A short run is up to 90 m. A long run is between 90 m - 250 m.

4.2.4 Local duct network conduit

The short run bend radius may be used on road crossings and starter conduit. The short run bend radius should only be used in close proximity to a pit or opening of a conduit (e.g. turning up a building wall).

Elbows (i.e. a sharp 90° change of direction) must not be used.

- P50 conduit bends utilised for local lateral conduits use a 90° x 305 mm radius bend where required.
- The bend radius of the P20 conduit bends is to be a minimum of 15 times the outer diameter of the conduit.

4.2.5 Conduit joints

Conduit joints for PVC pipes are achieved using ‘socket and spigot’ or ‘coupler’ and sealed with solvent cement.

4.2.6 Conduit installation

nbn requires the following when installing a conduit:

- Conduits are installed into trenches and must be supported with the appropriate bedding and suitable backfill for their length between pits, in accordance with the following guidelines (or as required by the local government authority):
  - *AS/NZS 2032:2006 Installation of PVC pipe systems*
  - *C524:2013 External Telecommunication Cable Networks*
  - *AS/CA S009:2020 Installation requirements for customer cabling (Wiring rules)*, as it applies to customer cabling products
- Conduits are installed in trenches with the minimum separation from other utilities, as per applicable local utility requirements, legislative requirements and shared trenching agreements (refer to Table 3 for information on clearances from other carriers and services).
- When multiple conduits are installed in one trench, the largest conduits are installed at the bottom of the trench.
- To facilitate future cable installation, conduits are placed as straight as possible within the trench.

4.2.7 Service drop conduits

nbn requires the following when installing service drop conduits to residential and commercial premises:

- for SDUs (including duplexes and triplexes), one P20 service drop conduit is required per premises
- for small commercial premises (i.e. small strip shops), one P20 service drop conduit is required per premises
- for all other commercial/industrial premises, a minimum P50 service drop conduit is required per premises
- for a vertical MDU (such as an apartment building or office block) of up to 60 internal premises, a P50 service drop conduit is required per premises.
- for a vertical MDU with more than 60 internal premises, a P100 service drop conduit required
- this conduit should meet the minimum requirements of:
  - *AS/CA S008:2020 Requirements for customer cabling product*s, as it applies to customer cabling products
  - *C524:2013 External Telecommunication Cable Networks*
- the conduit is labelled as per *AS/CA S008:2010 Requirements for customer cabling product*s, as it applies to customer cabling products
- all service drop conduits are sealed at both ends using conduit plugs located within the pit, and conduit caps at the stub end of service drop conduits are fitted with a 3 mm draw cord rated at a minimum 90 kg break force or similar

All draw cord must be rot proof (i.e. be of a synthetic material such as polypropylene).

4.2.7.1 Service drop installation

To prevent future access issues, service drop conduits must not cross into neighbouring private property. Specifically, for new development deployment:

- The service drop conduit is extended from either the LN or boundary pit (depending on whether it is a single or a dual side deployment) to the lot boundaries.
- The start of the conduit should be installed one (1) m inside the lot and sealed with an end cap. At the pit, the end of the conduit should be sealed with a plug and labelled for builders to easily locate.
- It must be labelled with the following information:
  - the lot which it is feeding (e.g. Lot 1234)
  - the position from the boundary (e.g. right = R or left = L)
  - the distance it can be located from the boundary in metres
- The label must be water resistant (typically nylon based) and can be handwritten using permanent marker or printed if desired.
- The label shall be securely affixed to the end of the drawstring itself, located inside the pit.

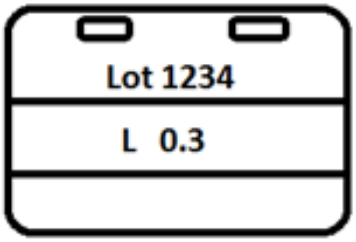

Figure 15. Example service drop stub label

- The furthest run of service drop conduit from the pit to the property boundary entry shall not exceed 25 m.
- Where practical to do so, multiple, individual service drop conduits should share property boundary pits.
- The conduit will be extended to the premises at a future date and should be located in a position to facilitate this.
- If the service drop conduit is less than 3 m from the pit to the property boundary entry, the minimum cover is 300 mm.
- If the service drop conduit is more than 3 m from the pit to the property boundary entry, the minimum cover is 450 mm.

4.2.7.2 Retaining walls

Service drop conduits (P20) must be installed under a retaining wall prior to the installation of the retaining wall. It is allowable to sleeve through a small section of P50 conduit from the property boundary.

> The P50 conduit would add some form of protection from the retaining wall/footings. Refer to the examples in Figure 16.

The service drop conduit should be installed to the acceptable minimum depth of cover within the lot (refer to Table 2), taking into account accessibility from the property boundary and connection of the future lead-in conduit.

A minimum curve or sweep can be applied to the P20 conduits (refer to Table 1).

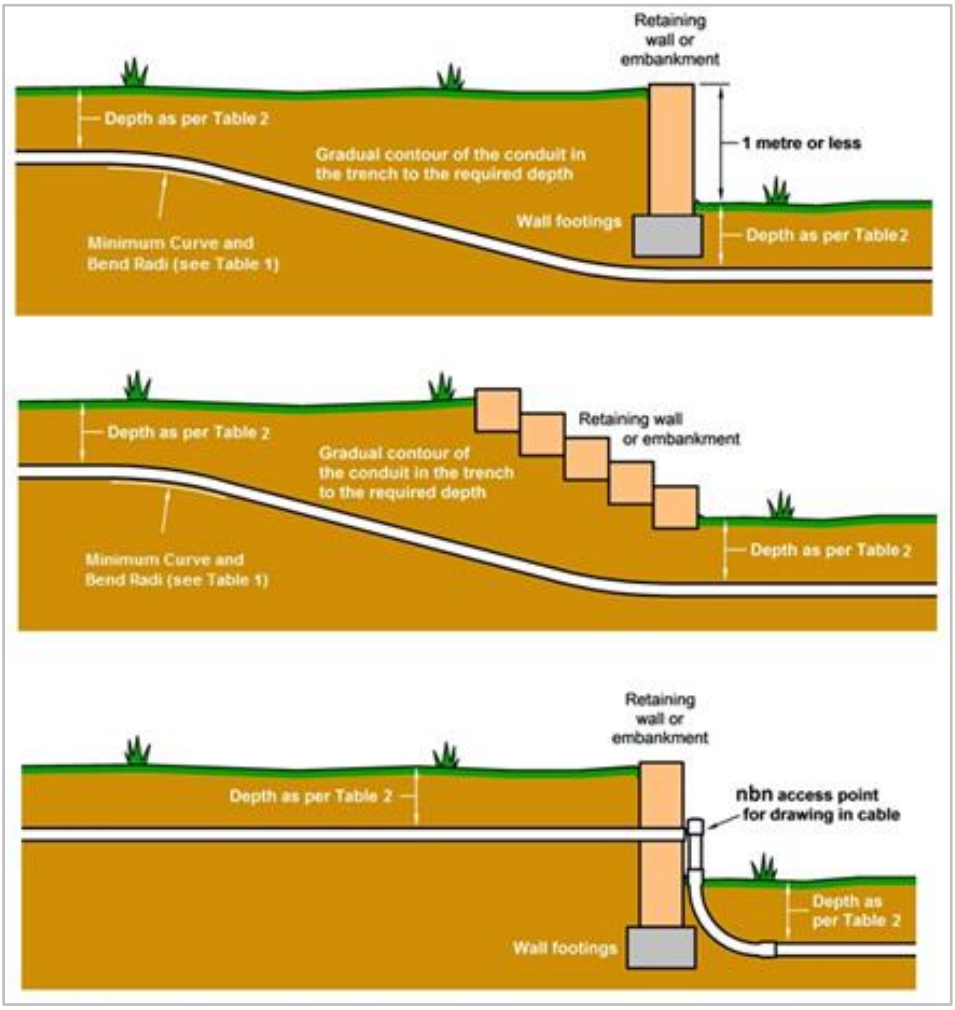

Figure 16. Examples of service drop conduits under retaining walls

4.2.8 Conduit testing

All installed conduits (except the service drop conduit) require testing via the use of a mandrel with a diameter of no less than 80% of the internal conduit diameter. This mandrel is hauled through to check for conduit concentricity and continuity.

After conduit testing has been performed:

- a 3 mm draw cord rated at a minimum 90 kg break force or similar (suitable for use as a cable hauling aid) shall be installed within each service drop conduit

- a 6-6.5 mm draw rope rated at a minimum 595 kg or equivalent shall be installed for all other installed conduits

All draw cord must be rot proof (i.e. be of a synthetic material such as polypropylene).

4.2.9 Conduit sealing

Once testing is finished and the conduit integrity has been identified as acceptable, all conduits are to be plugged within pits and conduit stubs capped (capped conduits include stage boundary and service drops).

4.2.10 Conduit Minimum Cover

The **nbn** minimum depth and cover of conduits in new development sites are listed in Table 2.

Table 2. Conduit depths and cover

Location	Minimum Cover
service drop conduit - less than 3 m from the pit to the boundary entry	300 mm
service drop conduit - more than 3 m from the pit to the boundary entry	450 mm
verge (walkways, footpaths)	450 mm
road (non-state or territory)	600 mm
road crossing	800 mm to 1200 mm (typically)

4.2.11 Conduit marker tape

Conduit marker tape is not required to be installed above the conduit.

4.2.12 Clearance from other carriers and services

Table 3. Clearance from other carriers and services

Service item		Minimum radial clearances *1
gas pipe	over 110 mm	300 mm
	110 mm or less	150 mm
power	high voltage	300 mm
	low voltage	100 mm*2
water mains	high pressure/capacity	300 mm

Service item		Minimum radial clearances *1
	local reticulation	150 mm
sewer	main	300 mm
	connection pipe	150 mm
other telecommunications	100 mm*1	

*1 Reduced separation is possible where all parties (including **nbn**) are consulted, and agreement is reached.

*2 Only where protection barriers are used, for example: conduit, bedding, marker tape and cover batten.

4.3 Pit guidelines

4.3.1 Pit types

The following table lists the pit types and definitions as a guide only:

Table 4. Pit types

Pit type	Description
service drop access pit	Provides an access location between the LN conduit and the service drop conduit. Only used to provide an access location for service drop fibre cable. Not to be used for any planned LN fibre cabling.
boundary pit	Provides an access location between the LN conduit and the service drop conduit.
LN pit	Located on the LN duct. Provides an access location between the LN conduit, local lateral conduit and the service drop conduit. Houses an SFM.
LN connection pit	Located on the local duct network. Houses a fibre splice closure.
distribution pit	Located on the DN conduit. Provides mid-point hauling locations. Houses distribution splice closures. Also installed at entry and exit locations of the new development to facilitate cable installation.
FJL pit	Houses a fibre splice closure. Provides a demarcation point between the DN and LN.
Manhole	Located on the DN conduit. Can house additional P100 and P50 conduit combinations that are over and above the standard pit conduit configuration. Provides mid-point hauling locations. Can be used in road infrastructure projects. Houses distribution splice closures. Can also be installed at the entry and exit locations of the new development to facilitate cable installation.

4.3.2 Pits and lids

Important: Internal dimensions are measured using the following methodology only.

Depth is measured by the distance between the inside of the pit base to the surface below the pit lid. Length and width are measured as follows:

a. along the centreline of the pit

b. on the inside of the base

c. at right angles to each other

d. with no internal protrusions on the surface

Table 5. Pit sizes (minimum internal and nominal external dimensions)

Pit purpose	Minimum internal dimensions (mm)			Nominal external dimensions (mm)			Industry pit type naming convention
	Length	Width	Depth	Length	Width	Depth	
service drop access pit	490	150	500	650	280	565	Type 2
service drop access pit or boundary pit or FJL pit	510	290	540	700	450	650	Type 5
Service drop access pit or LN pit or FJL pit	1130	340	600	1360	555	650	Type 6
distribution pit or LN connection pit	1130	390	820	1360	555	860	Type 8
distribution network manhole	2460	1100	1325	2600	1240	1490	Manhole

Pits and lids selected shall meet the following minimum requirements:

- Pit dimensions shall meet the requirements listed in Table 5.
- The pit construction shall ensure that the top rim of the lid will not warp or bend when installed as per the manufacturer's specifications.

- The pit and its fittings shall not have exposed sharp edges.
- Pit lids shall be concrete and weigh no more than 38 kg each, except where composite pit lids are installed by a developer, nbn would accept the installation providing the lid meets the AS 3996 Class B classification.

  NOTE: Composite pit lids are not to be used manholes.
- Pit lids shall have a pit lid lifting tool hole at each end of the lid/s, capable of being used with an industry accepted standard lifting tool.
- Pit lid lifting holes shall be designed to prevent the insertion of materials including needle sharps (e.g. by fitting a gasket).
- Pit lid surfaces shall be designed to prevent water gathering/pooling and have a slip resistance rating for wet conditions compliant with *AS/NZS 4586 -2013 Slip resistance classification of new pedestrian surface materials*. A certificate of compliance from the pit lid supplier must be available as evidence, if requested by **nbn**.
- Pits and pit lids shall have a load rating suitable for the location it is installed in as per *AS 3996 - 2006 Access covers and grates* Section 3.1.
- nbn pit lids shall be manufactured as per AS 3996 and shall be permanently labelled with:
  - Manufacturer's name or registered trademark.
  - The number of Australian Standard, i.e. AS 3996.
  - Load classification e.g. Class B
  - Weight of the lid
  - Carrier *(**nbn**; as per detail below (Figure 17))*
- The pit lids shall be embossed with the descriptor 'NBN'. The descriptor should resemble the format displayed in Figure 17.
  - The descriptor shall:
    - be positioned in the centre of the lid
    - be embossed in alignment with the longest side of the pit lid
    - be approximately 200 mm in length with the height dictated by the typeface used
    - use the typeface Arial
    - use capital letters

Figure 17. Required descriptor format

4.3.3 Recessed Lids (Access Cover)

Option for Recessed Access Cover can be used in accordance with applicable requirements outlined in AS 3996. The following requirements for Recessed Access Cover can be found in AS 3996:

- Pit frame shall have features to enable it, to be mechanically secured to the pit collar.
- Infill material, depth and bonding shall be suitable to ensure durability and suitable to the place of installations.
- Approximate mass of the cover including any infill shall be displayed as outlined in AS 3996.
- The structural Infill shall be placed, compacted, finished and cured in accordance to AS 3600.

nbn requirements for recessed pit lid:

- **nbn** will only allow recessed pit lid/s; the developer shall provide written agreement from the local council, that the council will accept liability and to source and replace the infill material, when it fails. Therefore every recessed pit lid request will need an approved AER, to capture contacts and agreement for replacement of infill materials. nbn reserve the right to replace any broken recessed pit lid with Class B composite lid/s.
- Allowed only for class B P5 and P6/8/9.
- Approximate mass of the cover including any infill shall be displayed as outlined in AS 3996.
- The structural Infill shall be placed, compacted, finished and cured in accordance to AS 3600.
- The pit lids shall be embossed with the descriptor ‘NBN’. The descriptor should resemble the format displayed in Figure 17.
- Combined weight of recessed pit lid with infill material should be less than 70kg

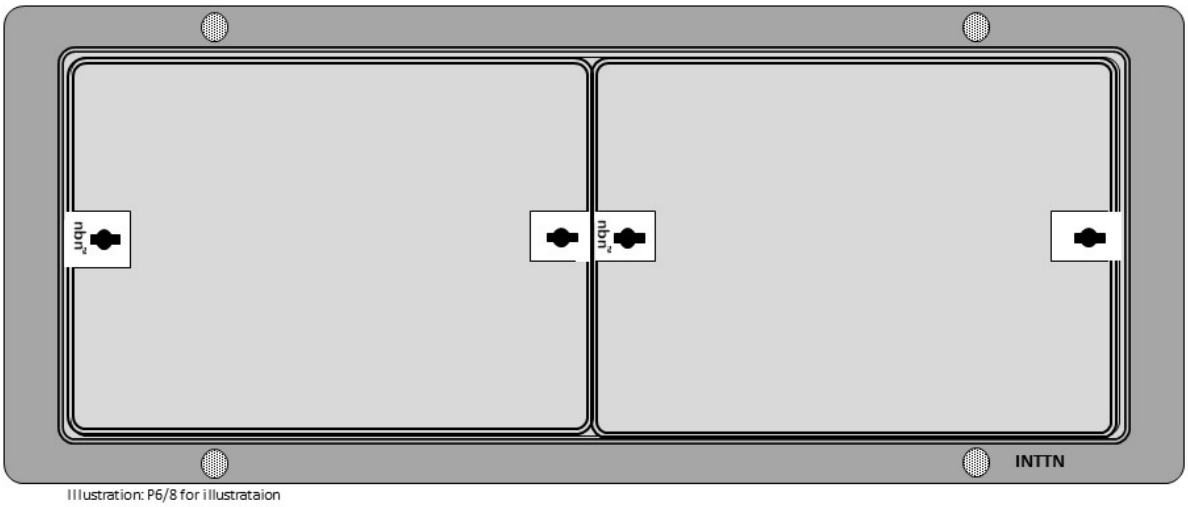

Figure 18. Example of Recessed Access Cover

4.3.4 Pit installation

4.3.4.1 Location

nbn requires the pit to be **sited in accordance with the standards** listed in Section 1.7 Referenced documents. Furthermore, the pit location should adhere to the following:

- Install pits in an easily accessible location to facilitate installation and operational tasks.
- The conduit network should be designed such that pits will reside in either a pathway/verge or in a garden bed. The installation of a pit across both a pathway/verge and a garden bed should be avoided.
- For single side and dual side deployments, position pits with their long side parallel to the adjacent property boundary or roadway.
- For laneway deployments, the boundary and service pits may be rotated 90° from the current standard of longest side parallel to the roadway.
- Pits are to be offset from the boundary so as to not interfere with any driveways or proposed driveways.
- Where practical, the longest side of the pit is to be offset 350 mm from the street facing property boundary.
- Ensure a minimum of one 3m separation from any pole without a transformer and/or street light or from any pole with an associated EPR zone, as specified in *AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules) and* ***NBN*** *EPR Management standard* ***NBN****-DES-STD-3294*.
- Ensure a minimum of 15 m separation from any pad mounted transformer or pole with a transformer (Earth Potential Rise [EPR] Zone), as specified in *AS/CA S009:2013 Installation requirements for customer cabling (Wiring rules)*.
- Where practical, a minimum of one (1) m separation from the Back of Kerb (BoK).
- A pit shall be installed within 6.5 m of where a street conduit changes direction (measured from the outside edge of the preformed bend socket) by an angle equal to or greater than 90°.
    - Where the 6.5 m conflict with other requirements, install the pit at the nearest safe location but no further than 15 m.
- Pits shall be placed in line with the conduit they connect with.
- A pit shall be installed at the intersection of conduit runs that require a change in size of the conduit, where the alignment continues into a street crossing or bends around a street corner. In this instance, the pit(s) shall be installed not less than 3 m and no further than 15 m along the alignment, from the corner of the adjacent property (refer to Figure 19)

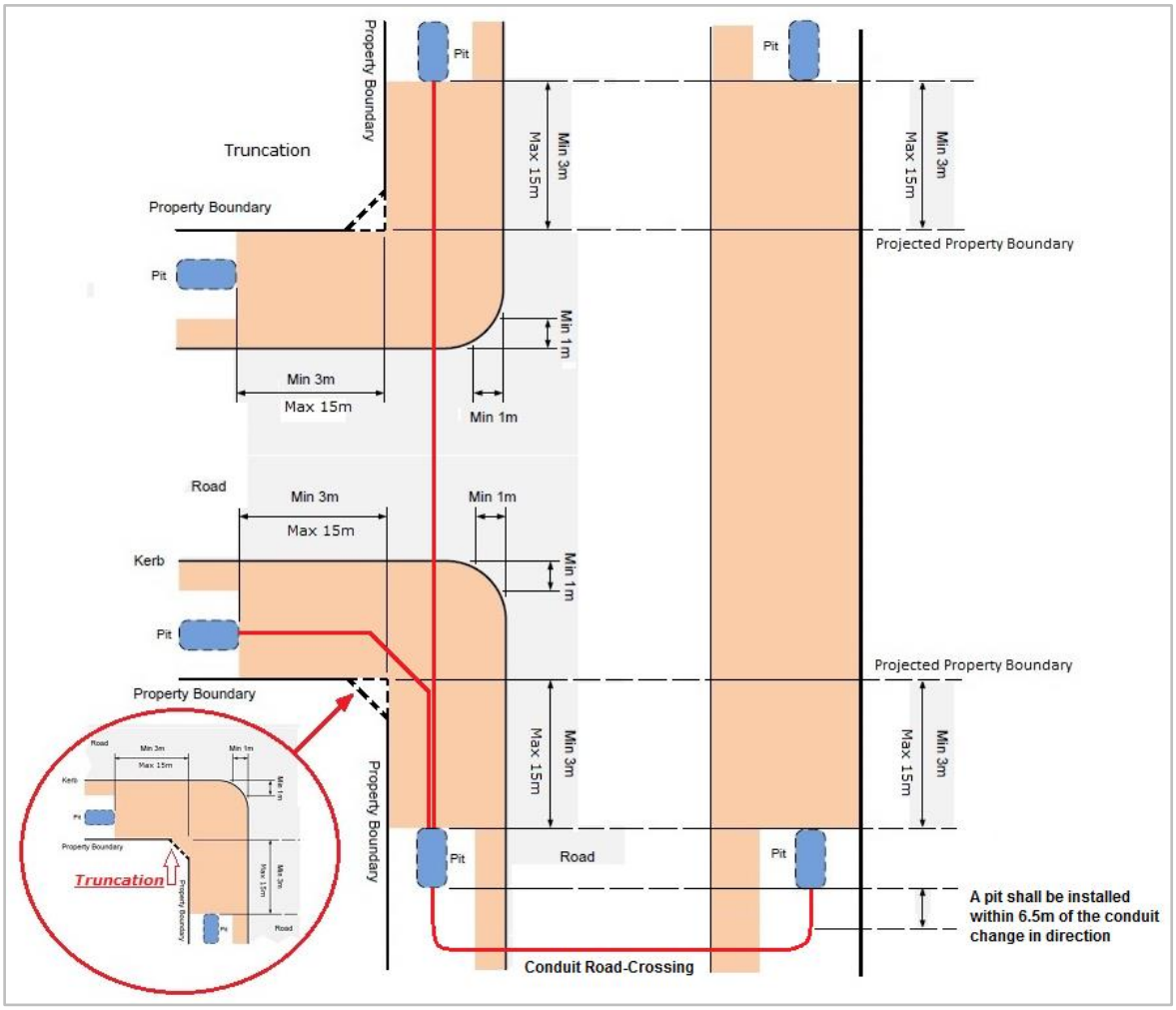

Figure 19. Example pit alignment for crossings/street corners

Pits shall not be installed:

- in unmade sections of carriageways
- outside a doorway
- in driveways
- in an area that is, or is to be, for use as a driveway
- in roadways areas
- on road edges (this includes parking bays)
- within a swale (i.e. open storm water drain, culvert or similar)
- in a hazardous area
- pits shall not be placed in areas that may be subject to EPR, as specified in *AS/CA S009:2020 Installation requirements for customer cabling (Wiring rules) and* ***NBN*** *EPR Management standard* ***NBN****-DES-STD-3294*
- pit risers shall not be used on any pit within a new development

4.3.4.2 Practices

nbn requires the following practices to be adopted:

- The use of pit bedding and backfill is required prior to pit installation. Specifically, the foundation will comprise of sand, stabilised sand or fine crushed rock approximately 100 mm in thickness. After installation, the foundation shall bring the top of the pit level with the surrounding area/final ground area. Additionally:
  - the backfill material shall not contain contaminants, debris, vegetation or waste
  - pits shall not be distorted by the backfill process
  - all backfilling shall be compacted using hand held rammers in layers not exceeding 150 mm in thickness, to minimise the risk of subsidence
  - in grassed areas:
    - backfill material shall stop within 50 mm of the finished surface level
    - a suitable top dressing shall be used to complete the reinstatement to the finished surface level
  - after installation, the pits shall conform to the surrounding soil and ground level or slope when reinstating
  - where the slope of the pit does not exceed a one (1) in eight (8) gradient, the pit shall be installed so the top of the pit:
    - is flush with the ground level or pavement
    - conforms to the general slope of the ground level or pavement on all sides

If the backfilling practices are not adhered to, the pits may buckle as soil subsides. If the pits buckle, the pit lids will no longer fit. Where a concrete collar surrounds the upper rim of the pit, it is important that its depth is constant.

For further information on backfill, refer to *G645:2017 Fibre Ready Pit and Pipe Specification for Real Estate Development Projects*.

4.3.5 Conduit installation into nbn™ pits

nbn requires the following when installing conduits into **nbn™** pits:

- install all conduits within a single trench into the pit that is located in the trench
- conduits:
  - that are distribution or local through conduits, are placed at the lowest point of the pit end wall
  - that are road crossing or direction change conduits, are placed roadside
  - that are service drop conduits, are placed property side and above all local and distribution conduits
  - shall not be installed within 50 mm of any vertical or horizontal internal corner of the pit and all entries shall be via the pit end only (the narrow end) (refer to *G654:2011 Fibre Ready Pit and Pipe Specification for Real Estate Development Projects*)
  - are located centrally with at least 50 mm of space between the conduit exterior and the internal pit floor
  - where multiple ducts enter a pit, 25 mm minimum separation is required between each duct

- have a draw string or similar installed (suitable for use as a cable hauling aid)
- are sealed with duct plugs

- Where required, conduits from the trench should be gradually reduced from the minimum cover to align with the pit wall entry, so that any and all conduits do not have a reduced cover of 450 mm even when multiple conduits are stacked at either pit wall ends.
- conduit ends:
  - finish square and flush with the pit end walls
  - are fitted with bushes flush with the pit wall ends
  - adhere to the conduit

Important: Holes in plastic pits for conduits shall be cut with the correct size hole saw to ensure a tight fit for bushes.

4.3.6 Maximum pipe combinations at each end of the pit

Table 6. Maximum pipe combinations at each end of the pit

nbn™ pit type	Industry pit type naming convention	P100	P50	P20 (LIC)
service pit	Type 2	0	1	2
		0	0	3
service pit or boundary pit or FJL pit	Type 5	1	2	0
		1	1	2
		1	0	4
		0	3	0
		0	2	2
		0	1	4
		0	0	4
LN connection pit	Type 6	2	0	2
		1	2	2
		1	0	4
		0	4	0

nbn™ pit type	Industry pit type naming convention	P100	P50	P20 (LIC)
		0	2	2
		0	1	4
		0	0	6
LN connection pit and distribution pit (standard)	Type 8	4	0	0
		3	2	0
		3	0	4
		2	4	0
		2	2	4
		1	4	4
Distribution network	Manhole	6	0	0
		4	2	0

4.3.7 Pits in Reactive soils

In some locations there are reactive soils, which are clay-type soils also called black soils that swell when wet and shrink on drying; this causes the pit walls to be crushed inwards damaging the pit and movement of the ducts at the entry point into the pit.

To prevent pit crushing and duct movement which will damage **nbn** cables inside the pits and ducts, pits which achieve Class 3 according to Load Classification AS3996 are to be installed. These pits are a steel reinforced concrete pit or high strength module polymer pits, which allows 5.000kg loading.

The pits are to be laid as per Section 4.3.4.2 in crushed rock or other types of fill as specified by the pit manufacturer and or the local authority, the specifics of handling and placing the pit is detailed in the installation specifications supplied by the manufacturer of the pit type used.

Conduit ends are to be flush with the pit internal end walls are fitted with bushes for sealing.

Refer to Table 6 for setting the duct entry combination, the high strength polymer is to be drilled with a suitable hole-saw as with plastic pits and ensure the concrete pit knock outs fit the desired duct entry combination.

Follow pit sizing in Table 7.

Table 7. Reactive soils pits

Pit purpose	Minimum internal dimensions (mm)			Nominal external dimensions (mm)			Industry pit type naming convention
	Length	Width	Depth	Length	Width	Depth	
service drop access pit or boundary pit or FJL pit	510	290	540	840	590	925	Concrete 5
service drop access pit or boundary pit or FJL pit	510	290	540	760	583	412	High Strength 5pit
Service drop access pit or LN pit or FJL pit	1130	340	600	1465	741	650	High Strength 6pit
distribution pit or LN connection pit	1130	390	820	1395	580	900	Concrete 8
distribution pit or LN connection pit	2040	670	920	1800	575	900	Concrete 9
distribution pit or LN connection pit	2040	670	920	2200.50		971	High Strength 9Pit
distribution network manhole	2460	1100	1325	2600	1240	1490	Concrete Manhole

5 Glossary

Term	Description
ADT	Assisted Drafting Tool
AER	Architectural Exemption Request. It is an **nbn** process where proposals are reviewed by the Engineering team, during planning and design phase.
BoK	Back of Kerb
CAD	Computer Aided Design A format developed by Autodesk and used by the AutoCAD software application for 2D and 3D design and drafting.
DBYD	Dial Before You Dig
DN	Distribution Network The part of the network that connects the FAN to the FDH.
DP	Delivery Partner
EPR	Earth Potential Rise
EUP	End User Premises
FAN	Fibre Access Node A facility that houses the active equipment providing services to a FSA. Urban FANs may also provide a POI to access seekers.
FDH	Fibre Distribution Hub
FJL	Flexibility Joint Location The demarcation point between the DN and LN networks.
FSA	Fibre Serving Area
FTTP	Fibre To The Premises The network design in which the fibre network is deployed to each premises.
HS&E	Health, Safety & Environment
LN	Local Network The part of the network from the FDH down each street.

Term	Description
MDU	Multi Dwelling Unit A premise that contains more than one dwelling unit. This term is interchangeable with MPS.
MPS	Multi Premise Site
nbn	National Broadband Network
SFM	Small Footprint Multiport
SMP	Splitter Multiport
new developments	A new or undeveloped piece of land that represents the growth of the premises market.
POI	Point Of Interconnect
POS	Public Open Space
SDU	Single Dwelling Unit
WSE	Workplace Safety & Environment